
Comment

Response to DA 12-523

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Abstract

Comments on FCC Request for Comment, GN Docket 12-91, by John J. McDonough, WB8RCR, Section Emergency Coordinator and State RACES Officer for the State of Michigan.

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1. Importance of emergency Amateur Radio Service communications

"Importance of emergency Amateur Radio Service communications. As noted above, the statute requires a review of the importance of emergency Amateur Radio Service communications relating to disasters, severe weather, and other threats to lives and property."

—1.

1.1. Threat examples

"What are examples of disasters, severe weather, and other threats to life and property in which the Amateur Radio Service provided communications services that were important to emergency response or disaster relief? Provide examples of the important benefits of these services."

—1.a

In this day and age, Amateur Radio provides services to public safety officials in response to "all hazards". Emergencies rarely limit themselves to neat categories. Obvious cases include floods, tornadoes, hurricanes, ice storms, and other forms of severe weather. Amateurs have been called on to assist in cases of chemical release, wildfires, even major road accidents.

A great strength of Amateur Radio is its flexibility; the specific nature of the incident plays little role in determining whether Amateur Radio can assist. Amateur Radio is the only service authorized to design, construct, modify, adjust and operate its own equipment, giving it unequaled flexibility to respond to unusual situations.

1.2. Circumstances

"Under what circumstances does the Amateur Radio Service provide advantages over other communications systems in supporting emergency response or disaster relief activities? Under what circumstances does the Amateur Radio Service complement other forms of communications systems for emergency response or disaster relief?"

—1.b

Amateur Radio provides advantages over other services in a few situations:

- In cases where permanent infrastructure has been disabled or damaged.
- In cases where the incident demands a large number of communications only or primarily communications resources.
- In cases where the incident is remote and conventional infrastructure might not be available.

Amateur Radio can complement other forms of communication when

- Specialized capabilities are required to augment existing capabilities.
- In cases where professional public safety officials can be more effective when the communications can be delegated.
- In complex incidents where traditional communications capabilities may simply be overwhelmed.

1.3. Federal Policies and Programs

"What Federal Government plans, policies, and training programs involving emergency response and disaster relief currently include use of the Amateur Radio Service? What additional plans, policies, and training programs would benefit from the inclusion of Amateur Radio Service operations? How would Amateur Radio Service operations fit into these plans and programs?"

—1.c

The Radio Amateur Civil Emergency Service is an obvious Federal program focused on Amateur Radio. Most states utilize RACES to varying degrees. FEMA's Independent Studies courses more and more frequently incorporate Amateur Radio in recognition of the importance of Amateur Radio in responding to incidents.

Many states require amateurs to take certain of the FEMA IS courses to be credentialed for entry to certain critical areas. The relevance of those courses is not always obvious to amateurs, especially those not in leadership positions. As volunteers, they are often unwilling to invest time and effort into activities they view as without merit. It would be extremely helpful if variants of those courses incorporated Amateur Radio more deeply.

1.4. Local Policies and Programs

"What State, tribal, and local government plans, policies, and training programs involving emergency response and disaster relief currently include use of the Amateur Radio Service? What additional plans and programs would benefit from the inclusion of Amateur Radio Service operations? How would Amateur Radio Service operations fit into these plans and programs?"

—1.d

The needs of each local jurisdiction vary widely, as does the ability of the local amateurs to respond to those needs. Because of that, it is difficult to make generalizations.

Many local jurisdictions include Amateur Radio in varying degrees. These differ based on the needs and resources of the community, and evolve (or should evolve) continually.

Some typical ways in which Amateur Radio is included in local plans are:

- During severe weather events amateurs typically provide a circuit to and from the National Weather Service, as well as providing field observations to the EOC.
- In search and rescue operations, amateurs often provide communications from the search teams to the search coordinator. (Within-team communications typically rely on unlicensed services such as FRS.)
- During incidents involving large numbers of victims, amateurs are often tasked with communicating between receiving stations and medical facilities. In cases where large number of victims must be transported, amateurs often provide communications between the vehicle (often a school bus) and the medical facility or EOC.
- Amateurs frequently relay damage assessment information back to the EOC, especially following severe weather incidents.
- In many cases, amateurs are relied on to relay status information from the incident scene to the EOC or local command post. Counties often have command vehicles equipped with amateur radio positions to facilitate this service
- In most communities hosting nuclear power plants, amateurs are written into the plans to provide backup communications among the plant EOC, the command post, and the county EOC.
- In cases where local infrastructure is compromised, amateurs provide communications between Red Cross shelters and the EOC.
- Amateurs often "shadow" public safety officials at a scene, relieving them of communications duties while they focus on the incident response.

At the State level:

- Amateurs provide backup communications among the ICP, the scene, the SEOC and other relevant locations.
- Amateurs, in the form of MARS operators, often provide skilled operators for SHARES communications to Federal agencies.
- Because Amateur Radio tends to be the only "agency" at the State EOC whose mission is solely communications, the Amateur Radio representative, typically the State RACES Officer or Section Emergency Coordinator, is sometimes tasked with developing the communications portion of the Incident Action Plan.

1.5. Changes to Part 97

"What changes to the Commission's emergency communications rules for the Amateur Radio Service (Part 97, Subpart E) would enhance the ability of amateur operators to

support emergency and disaster response? In addition, are there any specific changes that could be made to the technical and operational rules for the Amateur Radio Service (Part 97, Subparts B, C, and D) that would enhance the ability of amateur operators to support emergency and disaster response? What other steps could be taken to enhance the voluntary deployment and effectiveness of Amateur Radio Service operators during disasters and emergencies?"

—1.e

Amateurs, of course, are accustomed to operating within the regulation, and operational plans and procedures reflect this bias. That makes envisioning modifications to the rules somewhat difficult. Nevertheless, there are a few areas where opportunities are apparent.

1.5.1. Subpart E - Emergency Communications

Much of 97.407 is confusing and seems to be open to all sorts of interpretations. It may be that the Federal view of RACES is quite different than the local view, but in any case, it would seem that substantial work is indicated for 97.407.

97.407(c)(1) implies that a station in RACES service may only communicate with another RACES station, although one could interpret 97.407(c)(2) as broadening that. This precludes many important communications such as utilizing NTS for longer distance traffic or even asking a neighboring community for assistance. As a consequence of that, Michigan strongly discourages the use of RACES, preferring ARES instead which is not subject to those limitations. However, some local emergency managers have a strong preference for RACES, making this problematic.

97.407(d) appears to further limit when RACES can be used, perhaps severely (although this very limited interpretation does not seem to be common at the local level).

97.407(b) appears to be in error where it states "pursuant to part 214 of this chapter". Part 214 appears to be in the next chapter.

1.5.2. Subparts B, C, and D - Technical Standards

1.5.2.1. 97.113(a)(4)

This part prohibits "messages encoded for the purpose of obscuring their meaning". In many cases in emergency communications, it would be helpful to be able to encrypt communications. Examples are providing patient information to hospitals, providing damage assessment information to an EOC, or communications within a search and rescue team. These all require some sort of obfuscation to protect victim privacy and operations are often strained to avoid the prohibition on encryption.

Communications which could reveal operational details of certain relief efforts could also benefit from encryption, in cases where release of the information to, for example, news media could compromise the operation.

1.5.2.2. 97.113(c)

This section prohibits retransmission of transmissions from other services. As discussed later, interconnect with public safety systems could, in some cases, be beneficial, and this interconnection could violate this paragraph.

1.5.2.3. 97.303, 97.305

Although most emergency communications are handled on VHF frequencies, HF, particularly within state, is also often used. Usually these communications are relatively short range, and thus lower frequencies are used more often. During periods of higher solar activity and in the summer, the 3.5-4 MHz segment is too noisy or absorption too high to be useful. However, these periods do not always coincide with a sufficiently high critical frequency to support short range communications on the 7 MHz segment.

At these times, the frequencies in the 5330.5-5406.4 segment become particularly useful. However, the limited number of frequencies in this segment sometime makes it challenging to find an available channel. Additional frequencies in this segment could be very helpful.

Specifically from the standpoint of emergency response, opening up additional frequencies to communications for emergency response could be even more beneficial. But while the result could be very helpful, the actual wording of such a regulation could be challenging.

The limitation of only a single 150HA1A or 60H0J2B signal per channel also compounds this problem. These modes could support a dozen or more signals within the 2.8 kHz channel space. Permitting this could provide some relief without the need to open additional, obviously very scarce, channels.

1.5.2.3.1. 97.307(f)

This section restricts "symbol rates" for various types of data communications. At one time, symbol rates could be equated to bandwidth and this restriction made sense. With advances in modulation methods and symbol encoding schemes, this section has less relevance. Data communications is becoming more important in emergency communications, and as the Federal Government plays an ever larger role in emergency response, the complexity of messages to be transmitted, especially between EOCs, has expanded greatly. This results in this restriction being increasingly onerous.

1.5.3. Available Training

"What training from government or other sources is available for Amateur Radio Service operators for emergency and disaster relief communications? How could this training be enhanced? Should national training standards be developed for emergency communications response?"

—1.f

Currently, training for amateurs comes from a small number of sources:

- FEMA Independent Study sources. These courses do not typically focus specifically on communications technology but on other important aspects of emergency response.
- Online and in-person training provided by the State EMA. These are similar to FEMA courses in many respects.
- ARRL Emergency Communications courses. These do tend to focus on specifics of communications.
- Training provided through the ARRL Section or through local radio clubs. These typically focus on very targeted skills or technologies.
- Drill and exercises through Amateur Radio Emergency Services at the state level. These often present challenging communications tests although interface with served agencies only occasionally.
- Drills and exercises with the local jurisdiction EMA. These vary widely in scope and complexity and to the degree in which amateur radio is engaged. For some jurisdictions this may be some of the most effective training, but there are wide variations between jurisdictions.
- Drills and exercises conducted by the State EMA. These can be quite comprehensive in terms of integration with other agencies and systems, but typically impact only a small number of amateurs.

There is a significant need to strengthen all these approaches. A few possibilities come to mind:

- It is often difficult for amateurs to see how the FEMA courses, especially those around incident command, are relevant to amateur radio. Versions of these courses showing the practical application could make it easier for more amateurs to become trained in these necessary skills.
- A similar problem exists at the State level, but perhaps more significant, these State courses are often unavailable to most amateurs, are held at times and locations that are challenging for volunteers, or their existence is simply not well known among amateurs.
- ARRL Emergency Communications courses offer significant value and cover important topics not addressed by FEMA, but it is difficult for some to recognize just how limited the resources of individual citizens are, especially in rural areas. Even the low cost of these courses is a burden for many. In addition, because they are provided by the League, rather than the government, they do not carry the credibility with emergency management officials of government courses.

Probably nothing in the way of courses, would be more valuable than having these courses delivered at no cost to the amateur by FEMA.

- Training provided through the ARRL Section or local radio clubs can be quite uneven. Often these entities lack the resources to develop adequate training, and rarely is there a well thought-out curriculum. Rather, the training reflects the interest of whatever individual is motivated to provide it. The availability of no or low cost videos or slide presentations could be a significant benefit and would likely be embraced by local clubs in particular.
- Drills and exercises provided through the State or Section ARES organization can be quite good, but it is very challenging to organize meaningful state-wide exercises. Additionally, few amateurs possess the knowledge to develop good exercises. FEMA offers excellent guidance through their Independent Study courses, but the FEMA process, while quite good, is very burdensome to volunteers. Skilled resources to assist in developing these exercises would be one way to improve them, but it seems an unlikely approach.
- Exercises conducted by the local EMA probably could be the most effective, but rarely are amateurs fully engaged in these exercises. This is partly a result of the local jurisdiction not having the resources to test anything beyond what are their highest priorities, but also partly from a lack of understanding of the issues confronting amateurs in their jurisdiction. While some local emergency managers would probably welcome greater amateur participation, few amateurs have the skills to describe how they could be meaningfully incorporated.
- State level EMAs often can produce better exercises, and at the State or Section level amateur leadership is more likely to at least understand FEMA's HSEEP. But State exercises focus on state agencies, and even then the focus tends to be on the Emergency Operations Center staff, so the ability to impact a significant number of amateurs is limited.

1.5.4. Capabilities

"What communications capabilities, e.g., voice, video, or data, are available from Amateur Radio Service operators during emergencies and disasters? Are there any future technical innovations that might further improve the Amateur Radio Service?"

—1.g

Amateurs bring all needed technologies to the table during an incident, depending on the particular incident. Some examples;

- Tactical communications are typically handled by radiotelephone, especially VHF/UHF FM. Frequently, hand held or mobile radios are used to bring information from the field.
- In Southeastern Michigan, the 17 counties in the Detroit Weather Service coverage area are paged when severe weather is anticipated, and each county starts a VHF SKYWARN net, where amateurs

spread out across the county and report observations back to the net. Each county SKYWARN net sends a representative to a UHF net run by a team at the NWS office and conducted on a system of linked repeaters which collects significant reports. In many cases, the observer in the field has, in addition to a voice radio, a radio operating Automatic Position Reporting System which allows the NWS office to see on a map the exact position of the observer.

- In some counties, VHF packet is used to transmit damage assessment information back from the field. While not totally secure, VHF packet is unlikely to be intercepted by, for example, the news media.
- Amateurs can relay images back from an incident scene using slow scan TV. This provides still images back to the EOC which can be very helpful to the staff at the EOC.
- PACTOR or similar HF packet technologies are used between State EOCs to transmit requests for assistance or information on available resources.

Recently, a technology called HSMM/Mesh is being deployed to provide live motion video from a scene. Traditional amateur video has been used in the past, but the relatively small spectrum available and the cost of repeaters for the limited use has prevented widespread adoption. HSMM/Mesh gets around the cost issues by modifying inexpensive consumer equipment and the bandwidth issues by moving to higher frequencies. The higher frequencies mean multiple repeaters are required, but the very low cost makes this feasible.

D-Star and other digital voice systems are being used more frequently when some privacy is needed. Although not truly secure, these systems do make it less likely that communications will be monitored. The cost of these systems, however, discourages their widespread use, except in cases where equipment is purchased with government grants.

1.5.5. Data transmission standards

"Are national standards in data transmission needed to enhance the ability of Amateur Radio Service operators to respond to emergencies and disasters? Are there restrictions with regard to transmission speeds that, if removed, would increase the ability of operators to support emergency/disaster response? If so, what issues could arise from removing these restrictions?"

—1.h

One has to be careful in applying standards, especially when a service like amateur radio is involved, part of whose value is in experimentation, but whose operators tend to not have great resources. Imposition of standards requiring equipment that many amateurs cannot afford could obviously reduce the available resources. Some techniques, while not expensive, are complex to implement and also discourage amateurs from implementing those modes, even though they might be particularly effective. Poorly thought out standards could also inhibit development of new and more effective modes and procedures.

Nevertheless, the wide proliferation of data transmission modes does raise the possibility of amateurs lacking common modes. Some sort of minimum standards, recommending that at least certain facilities, for example EOCs, have some specific capabilities, especially if those capabilities are accessible to amateurs with limited means, could be a significant help.

For example, were a standard promulgated that all EOCs should have the capability to send and receive flmsg wrapped MT-63 1K traffic, it would likely become quickly adopted, and would encourage the use of that mode among amateurs who might communicate with EOCs. That mode (and MT-63 is only an example, there are dozens with similar characteristics) is simple to use and requires little in the way of specialized equipment. In contrast, modes like PACTOR III, which could be more effective, are unlikely to achieve widespread use due to cost and complexity. Even if funding were available to equip EOCs, few

amateurs would become familiar with the mode since they cannot afford the equipment, and despite their obvious advantages, packet modes tend to be difficult to implement.

1.5.6. Interconnect with public safety

"Would it enhance emergency response and disaster relief activities if Amateur Radio Service operators were able to interconnect with public safety land mobile radio systems or hospital and health care communications systems? What could be done to enable or enhance such interconnections? What issues could arise from permitting such interconnections?"

—1.i

Interconnect with public safety offers some interesting possibilities, perhaps more in data interconnect than voice. Since this interconnect has been prohibited, it is difficult to foresee the potential.

A challenge, especially with voice, is that public safety regulations are quite different from amateur radio, and public safety officials often are not aware of amateur regulations, so protection from misuse could be an issue. At least initially, such interconnect should be limited to bona fide emergency response organizations in the context of an actual incident or exercise.

1.5.7. Certification

"Should there be national certification programs to standardize amateur radio emergency communications training, mobilization, and operations? How would such programs improve emergency communications?"

—1.j

Many agencies as well as the ARES community have been expecting, and perhaps looking forward to, some sort of credentialing program through FEMA, which has failed to materialize. These rumors of programs have tended to be more focused on incident command skills rather than communications skills.

A challenge in certification beyond the very basics raises the issue of variation between jurisdictions. Even within the State of Michigan, there are huge differences from county to county in terms of resources, geography, demographics, and risks. These environmental differences result in a great disparity in needs and ability to respond to those needs. Only a very minimum subset of skills are applicable across all jurisdictions.

Nevertheless, some sort of certification or credentialing could be a great help in cases where resources must be brought in from outside the local jurisdiction, and even within larger jurisdictions where the local officials cannot get to know the amateurs' capabilities. Such a program would need to be flexible enough to respond to the widely varying needs and resources.

2. Impediments to enhanced Amateur Radio Service communications

"Impediments to enhanced Amateur Radio Service communications. The statute also requires that the study identify impediments to enhanced Amateur Radio Service communications and recommendations regarding the removal of such impediments."

—2.

2.1. Land use restrictions

"What private land use restrictions on residential antenna installations have amateur radio operators encountered? What information is available regarding the prevalence of such restrictions? What are the effects of unreasonable and unnecessary restrictions on the amateur radio community's ability to use the Amateur Radio Service? Specifically, do these restrictions affect the amateur radio community's ability to respond to disasters, severe weather, and other threats to lives and property in the United States? What actions can be taken to minimize the effects of these restrictions?"

—2.a

Many amateurs experience antenna restrictions that adversely affect their ability to operate. Here in Michigan those restrictions seem not to be as prevalent as in some other states, but they are a problem.

Rarely do these restrictions directly affect the ability to respond at the time of an incident. Rather, the effect comes in having amateurs available to respond. If an amateur cannot effectively participate in the hobby, then he will not be involved in emergency response.

Many amateurs get involved early in life, and then tend to be less active during their family raising years, and then again become active later. When an amateur moves into a neighborhood with antenna restrictions he is more likely to loose interest, and thus not be available for emergency response.

Perhaps as significant, if an amateur cannot build reasonable antennas, then he is less likely to be licensed in the first place.

Perhaps more significant in the longer term is sparking the interest in the first place. Children see a neighbor with large antennas, discover what it is about, and develop an interest in radio. When antennas are non-existent or invisible, that interest never develops in the first place.

It is difficult to overstate the magnitude of this problem. Michigan needs many more amateurs to become involved in emergency response, especially as government officials recognize the value, thanks partly to FEMA and partly to a very forward looking State Police Emergency Management and Homeland Security Division. And yet, Michigan has one of the largest ARES organizations in the nation with some 2,000 amateurs having chosen to participate actively in emergency response. The problem must be more severe in other states, where the ARES participation rate is a fraction of Michigan's.

2.2. Reasonableness criteria

"What criteria distinguish "unreasonable or unnecessary" private land use restrictions from reasonable and necessary restrictions? How do local circumstances, such as neighborhood density or historic significance, affect whether a private land use restriction is reasonable or necessary? How does the availability of alternative transmitting locations or power sources affect the reasonableness of a particular private land use restriction?"

—2.b

Certainly, restrictions clearly related to public safety, such as requiring proper engineering of supporting structures, ensuring that antennas cannot fall on power lines or damage a neighbor's property are "reasonable". Many homeowner's associations, however, prohibit any antennas. Even restrictions on visible antennas, or unrealistic height limitations are a problem.

In some areas it is virtually impossible to find housing that does not come with these kinds of restrictive covenants, and these restrictions are becoming more and more common. Most amateurs do not have great resources, and when much of the housing is restricted, it can be more difficult to find affordable housing at a realistic price.

And rarely, if ever, is an alternate transmitting site an option. Few clubs anymore can afford club stations, and a private location is out of reach of the vast majority of amateurs.

2.3. Risk minimization

"What steps can amateur radio operators take to minimize the risk that an antenna installation will encounter unreasonable or unnecessary private land use restrictions? For example, what obstacles exist to using a transmitter at a location not subject to such restrictions, or placing an antenna on a structure used by commercial mobile radio service providers or government entities?"

—2.c

Tower space is usually expensive. On rare occasions a commercial station or government entity can be convinced to donate space for a repeater, especially if such a repeater is to be used for emergency response, but this offers little help to the average amateur.

The availability of VHF repeaters does make some portions of the hobby accessible to those who might otherwise be unable to participate, but most of the wide dimensions of amateur radio remain beyond their reach. This makes amateur radio a less interesting pursuit, and as indicated above, recruiting is still the top issue.

2.4. Commission impediments

"Do any Commission rules create impediments to enhanced Amateur Radio Service communications? What are the effects of these rules on the amateur radio community's ability to use the Amateur Radio Service? Do disaster and/or severe weather situations present any special circumstances wherein Commission rules may create impediments that would not otherwise exist in non-disaster situations? What actions can be taken to minimize the effects of these rules?"

—2.d

Most of the impediments have been mentioned earlier. Of particular relevance to emergency communications are:

- Encryption: in incident response, a degree of security is required which is not typical of normal amateur practice.
- Symbol rates: government agencies require longer messages than typical amateur practice. Low speeds frustrate this.
- 5 MHz capabilities: the ability to reliably communicate with specific stations is more critical in emcomm; frequencies above 40 meters or below 80 are rarely useful, but the split between 80 and 40 is too wide.

2.5. Other impediments

"What other impediments to enhanced Amateur Radio Service communications have amateur radio operators encountered? What are the effects of these impediments on the

amateur radio community's ability to use the Amateur Radio Service? Specifically, do these impediments affect the amateur radio community's ability to respond to disasters, severe weather, and other threats to lives and property in the United States? What actions can be taken to minimize the effect of these impediments?"

—2.e

From a purely emergency communications perspective, the greatest impediments are the lack of well targeted training and the lack of understanding of amateur radio's capabilities and limitations on the part of professional responders.

As mentioned earlier, there are probably opportunities for FEMA to deliver better targeted training, although improving exercises could be very challenging. On the other side, there was recently a course on amateur radio for emergency managers at least proposed, but appears to be not well advertised.

Earlier in this document some mechanism to better develop amateur radio exercises was mentioned. Some program for hands-on assistance to developing amateur radio focused exercises could have a major impact, but such a program would likely be relatively expensive to implement. However this writer can think of nothing that could have greater effect.

2.6. Enhancements

"The legislation requires the Commission to identify "impediments to enhanced Amateur Radio Service communications." What specific "enhance[ments]" to Amateur Radio Service communications have been obstructed by the impediments discussed above?"

—2.f

Once again, regulations that focus on specifics, rather than results, can substantially inhibit experimentation, and thus development. Were it not for the symbol rate limitation, for example, one would expect much greater improvements in high speed HF data transmission. Since the point of those regulations seems to be intended to limit bandwidth, why not simply limit bandwidth and leave it to the imagination of the practitioners to come up with the most effective way to use that bandwidth?

3. Conclusions

There are many opportunities to improve the ability of amateur radio to respond to emergencies and other incidents. Many of these are beyond the capability of the Commission to address. This author, and the Michigan Section, would like to thank the Commission for providing a well structured framework in which to share thoughts on possible improvements, and the Congress for recognizing the need.

